

Amendments to the Claims

The claims have been amended as follows. Underlines indicate insertions and ~~strikeouts~~ indicate deletions.

Please cancel claim 16.

Please amend the claims as follows:

1. (Currently amended) A method of forming a hardened surface on a substrate, comprising:

providing a substrate; and

forming a molten alloy and cooling said alloy to form a metallic glass coating on the substrate, the forming comprising forming a successive buildup of ~~continuous layers~~ metallic glass layers, the metallic glass coating having a hardness of at least about 9.2 GPa, and comprising an alloy containing fewer than 11 elements and wherein said alloy contains one or both of molybdenum and tungsten.

2. (Currently amended) A method of forming a hardened surface on a substrate, comprising:

providing a substrate;

forming a molten alloy and cooling said alloy to form a metallic glass coating on the substrate and having a first hardness of at least about 9.2 GPa, the metallic glass comprising fewer than 11 elements; and converting at least a portion of the metallic glass coating to a crystalline material having a nanocrystalline grain size and a second hardness of at least about 9.2 GPa

3. (Amended) The method of claim 2 1 wherein the substrate is a metallic material.

4. (Amended) The method of claim 2 1 wherein the substrate is a ceramic material.
5. (Original) The method of claim 2 wherein the first hardness is at least about 10.0 GPa.
6. (Amended) The method of claim 2 1 wherein the metallic glass comprises fewer than 7 elements.
7. (Amended) The method of claim 2 1 wherein the metallic glass coating is applied to the substrate as a plasma spray.
8. (Amended) The method of claim 2 1 wherein the forming the metallic glass coating comprises an application of an atomized powder of a metallic glass material over the substrate.
9. (Original) The method of claim 2 wherein the forming a metallic glass coating comprises forming a successive buildup of continuous layers.
10. (Original) The method of claim 2 wherein the converting comprises heating the metallic glass to above a crystallization temperature of the metallic glass.
11. (Original) The method of claim 10 wherein the heating comprises heating to a temperature of at least about 600°C and below a melting temperature of the metallic glass.

12. (Original) The method of claim 2 wherein the second hardness is at least about 10.0 GPa.

13. (Currently amended) A method of forming a hardened surface on a substrate, comprising:

providing a substrate;

forming a molten alloy and cooling said alloy to form a metallic glass coating on the substrate; the forming comprising a successive build-up of metallic glass layers, the metallic glass comprising one or more materials selected from the group consisting of $(\text{Fe}_{0.85}\text{Cr}_{0.15})_{83}\text{B}_{17}$, $(\text{Fe}_{0.8}\text{Cr}_{0.2})_{83}\text{B}_{17}$, $(\text{Fe}_{0.75}\text{Cr}_{0.25})_{83}\text{B}_{17}$, $(\text{Fe}_{0.6}\text{Co}_{0.2}\text{Cr}_{0.2})_{83}\text{B}_{17}$, $(\text{Fe}_{0.8}\text{Cr}_{0.15}\text{Mo}_{0.05})_{83}\text{B}_{17}$, $(\text{Fe}_{0.8}\text{Cr}_{0.2})_{79}\text{B}_{17}\text{C}_4$, $(\text{Fe}_{0.8}\text{Cr}_{0.2})_{79}\text{B}_{17}\text{Si}_4$, $(\text{Fe}_{0.8}\text{Cr}_{0.2})_{79}\text{B}_{17}\text{Al}_4$, $(\text{Fe}_{0.8}\text{Cr}_{0.2})_{75}\text{B}_{17}\text{Al}_4\text{C}_4$, $(\text{Fe}_{0.8}\text{Cr}_{0.2})_{75}\text{B}_{17}\text{Si}_4\text{C}_4$, $(\text{Fe}_{0.8}\text{Cr}_{0.2})_{75}\text{B}_{17}\text{Si}_4\text{Al}_4$, $(\text{Fe}_{0.8}\text{Cr}_{0.2})_{71}\text{B}_{17}\text{Si}_4\text{C}_4\text{Al}_4$, $(\text{Fe}_{0.7}\text{Co}_{0.1}\text{Cr}_{0.2})_{83}\text{B}_{17}$, $(\text{Fe}_{0.8}\text{Cr}_{0.2})_{80}\text{B}_{20}$, $(\text{Fe}_{0.8}\text{Cr}_{0.2})_{76}\text{B}_{17}\text{Al}_7$, $(\text{Fe}_{0.8}\text{Cr}_{0.2})_{79}\text{B}_{17}\text{W}_2\text{C}_2$, $(\text{Fe}_{0.8}\text{Cr}_{0.2})_{81}\text{B}_{17}\text{W}_2$, and $\text{Fe}_{64}\text{Ti}_3\text{Cr}_5\text{Mo}_2\text{B}_{16}\text{C}_5\text{Si}_1\text{Al}_2\text{La}_2$; the metallic glass coating having a hardness of at least about 9.2 GPa and

converting at least a portion of the metallic glass coating to a crystalline material having a nanocrystalline grain size.

14. (Original) The method of claim 13 wherein the metallic glass coating is applied to the substrate by a plasma spray system.

15. (Original) The method of claim 13 wherein the forming the metallic glass coating comprises an application of an atomized powder of a metallic glass material over the substrate.

16. (Cancelled) ~~The method of claim 13 wherein the forming a metallic glass coating comprises forming a successive buildup of continuous layers.~~

17. (Original) The method of claim 13 wherein the metallic glass coating comprises $(\text{Fe}_{0.85}\text{Cr}_{0.15})_{83}\text{B}_{17}$.

18. (Original) The method of claim 13 wherein the metallic glass coating consists essentially of $(\text{Fe}_{0.85}\text{Cr}_{0.15})_{83}\text{B}_{17}$.

19. (Original) The method of claim 13 wherein the metallic glass coating consists of $(\text{Fe}_{0.85}\text{Cr}_{0.15})_{83}\text{B}_{17}$.

20. (Original) The method of claim 13 wherein the metallic glass coating comprises $(\text{Fe}_{0.8}\text{Cr}_{0.2})_{83}\text{B}_{17}$.

21. (Original) The method of claim 13 wherein the metallic glass coating consists essentially of $(\text{Fe}_{0.8}\text{Cr}_{0.2})_{83}\text{B}_{17}$.

22. (Original) The method of claim 13 wherein the metallic glass coating consists of $(\text{Fe}_{0.8}\text{Cr}_{0.2})_{83}\text{B}_{17}$.

23. (Original) The method of claim 13 wherein the metallic glass coating comprises $(\text{Fe}_{0.75}\text{Cr}_{0.25})_{83}\text{B}_{17}$.

24. (Original) The method of claim 13 wherein the metallic glass coating consists essentially of $(\text{Fe}_{0.75}\text{Cr}_{0.25})_{83}\text{B}_{17}$.

25. (Original) The method of claim 13 wherein the metallic glass coating consists of $(\text{Fe}_{0.75}\text{Cr}_{0.25})_{83}\text{B}_{17}$.

26. (Original) The method of claim 13 wherein the metallic glass coating comprises $(\text{Fe}_{0.6}\text{Co}_{0.2}\text{Cr}_{0.2})_{83}\text{B}_{17}$.

27. (Original) The method of claim 13 wherein the metallic glass coating consists essentially of $(\text{Fe}_{0.6}\text{Co}_{0.2}\text{Cr}_{0.2})_{83}\text{B}_{17}$.

28. (Original) The method of claim 13 wherein the metallic glass coating consists of $(\text{Fe}_{0.6}\text{Co}_{0.2}\text{Cr}_{0.2})_{83}\text{B}_{17}$.

29. (Original) The method of claim 13 wherein the metallic glass coating of comprises $(\text{Fe}_{0.8}\text{Cr}_{0.15}\text{Mo}_{0.05})_{83}\text{B}_{17}$.

30. (Original) The method of claim 13 wherein the metallic glass coating consists essentially of $(\text{Fe}_{0.8}\text{Cr}_{0.15}\text{Mo}_{0.05})_{83}\text{B}_{17}$.

31. (Original) The method of claim 13 wherein the metallic glass coating consists of $(\text{Fe}_{0.8}\text{Cr}_{0.15}\text{Mo}_{0.05})_{83}\text{B}_{17}$.

32. (Original) The method of claim 13 wherein the metallic glass coating comprises $(\text{Fe}_{0.8}\text{Cr}_{0.2})_{79}\text{B}_{17}\text{C}_4$.

33. (Original) The method of claim 13 wherein the metallic glass coating consists essentially of $(\text{Fe}_{0.8}\text{Cr}_{0.2})_{79}\text{B}_{17}\text{C}_4$.

34. (Original) The method of claim 13 wherein the metallic glass coating consists of $(\text{Fe}_{0.8}\text{Cr}_{0.2})_{79}\text{B}_{17}\text{C}_4$.

35. (Original) The method of claim 13 wherein the metallic glass coating comprises $(\text{Fe}_{0.8}\text{Cr}_{0.2})_{79}\text{B}_{17}\text{Si}_4$.

36. (Original) The method of claim 13 wherein the metallic glass coating consists essentially of $(\text{Fe}_{0.8}\text{Cr}_{0.2})_{79}\text{B}_{17}\text{Si}_4$.

37. (Original) The method of claim 13 wherein the metallic glass coating consists of $(\text{Fe}_{0.8}\text{Cr}_{0.2})_{79}\text{B}_{17}\text{Si}_4$.

38. (Original) The method of claim 13 wherein the metallic glass coating comprises $(\text{Fe}_{0.8}\text{Cr}_{0.2})_{79}\text{B}_{17}\text{Al}_4$.

39. (Original) The method of claim 13 wherein the metallic glass coating consists essentially of $(\text{Fe}_{0.8}\text{Cr}_{0.2})_{79}\text{B}_{17}\text{Al}_4$.

40. (Original) The method of claim 13 wherein the metallic glass coating consists of $(\text{Fe}_{0.8}\text{Cr}_{0.2})_{79}\text{B}_{17}\text{Al}_4$.

41. (Original) The method of claim 13 wherein the metallic glass coating comprises $(\text{Fe}_{0.8}\text{Cr}_{0.2})_{75}\text{B}_{17}\text{Al}_4\text{C}_4$.

42. (Original) The method of claim 13 wherein the metallic glass coating consists essentially of $(\text{Fe}_{0.8}\text{Cr}_{0.2})_{75}\text{B}_{17}\text{Al}_4\text{C}_4$.

43. (Original) The method of claim 13 wherein the metallic glass coating consists of $(\text{Fe}_{0.8}\text{Cr}_{0.2})_{75}\text{B}_{17}\text{Al}_4\text{C}_4$.

44. (Original) The method of claim 13 wherein the metallic glass coating comprises $(\text{Fe}_{0.8}\text{Cr}_{0.2})_{75}\text{B}_{17}\text{Si}_4\text{C}_4$.

45. (Original) The method of claim 13 wherein the metallic glass coating consists essentially of $(\text{Fe}_{0.8}\text{Cr}_{0.2})_{75}\text{B}_{17}\text{Si}_4\text{C}_4$.

46. (Original) The method of claim 13 wherein the metallic glass coating consists of $(\text{Fe}_{0.8}\text{Cr}_{0.2})_{75}\text{B}_{17}\text{Si}_4\text{C}_4$.

47. (Original) The method of claim 13 wherein the metallic glass coating comprises $(\text{Fe}_{0.8}\text{Cr}_{0.2})_{75}\text{B}_{17}\text{Si}_4\text{Al}_4$.

48. (Original) The method of claim 13 wherein the metallic glass coating consists essentially of $(\text{Fe}_{0.8}\text{Cr}_{0.2})_{75}\text{B}_{17}\text{Si}_4\text{Al}_4$.

49. (Original) The method of claim 13 wherein the metallic glass coating consists of $(\text{Fe}_{0.8}\text{Cr}_{0.2})_{75}\text{B}_{17}\text{Si}_4\text{Al}_4$.

50. (Original) The method of claim 13 wherein the metallic glass coating comprises $(\text{Fe}_{0.8}\text{Cr}_{0.2})_{71}\text{B}_{17}\text{Si}_4\text{C}_4\text{Al}_4$.

51. (Original) The method of claim 13 wherein the metallic glass coating consists essentially of $(\text{Fe}_{0.8}\text{Cr}_{0.2})_{71}\text{B}_{17}\text{Si}_4\text{C}_4\text{Al}_4$.

52. (Original) The method of claim 13 wherein the metallic glass coating consists of $(\text{Fe}_{0.8}\text{Cr}_{0.2})_{71}\text{B}_{17}\text{Si}_4\text{C}_4\text{Al}_4$.

53. (Original) The method of claim 13 wherein the metallic glass coating comprises $(\text{Fe}_{0.7}\text{Co}_{0.1}\text{Cr}_{0.2})_{83}\text{B}_{17}$.

54. (Original) The method of claim 13 wherein the metallic glass coating consists essentially of $(\text{Fe}_{0.7}\text{Co}_{0.1}\text{Cr}_{0.2})_{83}\text{B}_{17}$.

55. (Original) The method of claim 13 wherein the metallic glass coating consists of $(\text{Fe}_{0.7}\text{Co}_{0.1}\text{Cr}_{0.2})_{83}\text{B}_{17}$.

56. (Original) The method of claim 13 wherein the metallic glass coating comprises $(\text{Fe}_{0.8}\text{Cr}_{0.2})_{80}\text{B}_{20}$.

57. (Original) The method of claim 13 wherein the metallic glass coating consists essentially of $(\text{Fe}_{0.8}\text{Cr}_{0.2})_{80}\text{B}_{20}$.

58. (Original) The method of claim 13 wherein the metallic glass coating consists of $(\text{Fe}_{0.8}\text{Cr}_{0.2})_{80}\text{B}_{20}$.

59. (Original) The method of claim 13 wherein the metallic glass coating comprises $(\text{Fe}_{0.8}\text{Cr}_{0.2})_{76}\text{B}_{17}\text{Al}_7$.

60. (Original) The method of claim 13 wherein the metallic glass coating of claim 13 consists essentially of $(\text{Fe}_{0.8}\text{Cr}_{0.2})_{76}\text{B}_{17}\text{Al}_7$.

61. (Original) The method of claim 13 wherein the metallic glass coating consists of $(\text{Fe}_{0.8}\text{Cr}_{0.2})_{76}\text{B}_{17}\text{Al}_7$.

62. (Original) The method of claim 13 wherein the metallic glass coating comprises $(\text{Fe}_{0.8}\text{Cr}_{0.2})_{79}\text{B}_{17}\text{W}_2\text{C}_2$.

63. (Original) The method of claim 13 wherein the metallic glass coating consists essentially of $(\text{Fe}_{0.8}\text{Cr}_{0.2})_{79}\text{B}_{17}\text{W}_2\text{C}_2$.

64. (Original) The method of claim 13 wherein the metallic glass coating of claim 13 consists of $(\text{Fe}_{0.8}\text{Cr}_{0.2})_{79}\text{B}_{17}\text{W}_2\text{C}_2$.

65. (Original) The method of claim 13 wherein the metallic glass coating of claim 13 comprises $(\text{Fe}_{0.8}\text{Cr}_{0.2})_{81}\text{B}_{17}\text{W}_2$.

66. (Original) The method of claim 13 wherein the metallic glass coating consists essentially of $(\text{Fe}_{0.8}\text{Cr}_{0.2})_{81}\text{B}_{17}\text{W}_2$.

67. (Original) The method of claim 13 wherein the metallic glass coating of claim 13 consists of $(\text{Fe}_{0.8}\text{Cr}_{0.2})_{81}\text{B}_{17}\text{W}_2$.

68. (Original) The method of claim 13 wherein the metallic glass coating of claim 13 comprises $\text{Fe}_{64}\text{Ti}_3\text{Cr}_5\text{Mo}_2\text{B}_{16}\text{C}_5\text{Si}_1\text{Al}_2\text{La}_2$.

69. (Original) The method of claim 13 wherein the metallic glass coating consists essentially of $\text{Fe}_{64}\text{Ti}_3\text{Cr}_5\text{Mo}_2\text{B}_{16}\text{C}_5\text{Si}_1\text{Al}_2\text{La}_2$.

70. (Original) The method of claim 13 wherein the metallic glass coating of claim 13 consists of $\text{Fe}_{64}\text{Ti}_3\text{Cr}_5\text{Mo}_2\text{B}_{16}\text{C}_5\text{Si}_1\text{Al}_2\text{La}_2$.